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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,885	09/29/2003	Martin Heugel	59958 (70301)	6825
21874	7590	07/24/2006	EXAMINER	
EDWARDS & ANGELL, LLP			EWALD, MARIA VERONICA	
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BOSTON, MA 02205			PAPER NUMBER	

1722

DATE MAILED: 07/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/675,885	HEUGEL, MARTIN	
	Examiner	Art Unit	
	Maria Veronica D. Ewald	1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-24 is/are pending in the application.
- 4a) Of the above claim(s) 16-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 12 – 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As written, claim 12 states “...changing the modal composition of the laser radiation wherein the modal composition of the laser is changed during manufacture of a three-dimensional object.” The addition of the amendment of claim 12 *does not provide any further structural limitation to the apparatus already indicated* in claim 12 and merely indicates the process in which the laser composition is changed and thus, renders the claim indefinite.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mattes, et al. (U.S. 5,876,767) in view of Borstel, et al. (U.S. 6,512,781).

Mattes, et al. teach a device for the layer-by-layer manufacture of a three-dimensional object by means of selective hardening at those sites of a layer of a building material that correspond to the cross-section of the object through the use of a laser (column 1, lines 58 – 60), the device comprising: a laser that provides radiation (item 5 – figure 1; column 2, lines 5 – 6); and a focusing unit that focuses the radiation to provide a focused beam (item 8 – figure 1; column 2, lines 7 – 8). However, Mattes, et al. do not teach that there is a beam expansion element or a switching element for changing the modal composition of the beam.

In a method to change the mode of a laser beam between Gaussian and ring modes, Borstel, et al. teach that there is a beam deflector and a control device (column 4, lines 20 – 23, 50 – 55). There are adaptive mirrors and a simple control device that allow the selective generation of the Gaussian mode or ring mode in the laser resonator (column 4, lines 48 – 50). To switch between the two modes, the gas laser employs the use of adaptive beam deflectors and one adaptive retro-mirror (column 4, lines 51 – 55). This reads on the Applicant's claims that the laser device be further comprised of a switching element for changing the modal composition of the laser radiation, wherein the switching element comprises at least one mode aperture and wherein the laser device be further comprised of a beam expansion element. The ability to switch between modal composition of the laser is especially important when the laser is used in Gaussian mode to focus on the smallest spot diameter and then is needed to

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switch to the ring mode when the laser can be aimed at a larger diameter focal spot (column 1, lines 20 – 27).

It would have been obvious at the time of the Applicant's invention to one of ordinary skill in the art to modify the apparatus of Mattes, et al. with the control element of Borstel, et al. for the purpose of being able to easily and quickly switch between the Gaussian and ring modes depending on whether a small spot or larger spot diameter is being focused on by the laser beam as taught by Borstel, et al.

Claims 12 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith (U.S. 6,391,245) in view of Borstel, et al. (U.S. 6,512,781). Smith teaches a device for the layer-by-layer manufacture of a three-dimensional object by means of selective hardening at those sites of a layer of a building material that correspond to the cross-section of the object through the use of a laser (column 5, lines 50 – 55), the device comprising: a laser that provides radiation (column 3, lines 60 – 65); and a focusing unit that focuses the radiation to provide a focused beam (column 4, lines 1 – 5; column 6, lines 34 – 35). However, Smith does not teach that there is a beam expansion element or a switching element for changing the modal composition of the beam.

In a method to change the mode of a laser beam between Gaussian and ring modes, Borstel, et al. teach that there is a beam deflector and a control device (column 4, lines 20 – 23, 50 – 55). There are adaptive mirrors and a simple control device that allow the selective generation of the Gaussian mode or

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ring mode in the laser resonator (column 4, lines 48 – 50). To switch between the two modes, the gas laser employs the use of adaptive beam deflectors and one adaptive retro-mirror (column 4, lines 51 – 55). This reads on the Applicant's claims that the laser device be further comprised of a switching element for changing the modal composition of the laser radiation, wherein the switching element comprises at least one mode aperture and wherein the laser device be further comprised of a beam expansion element. The ability to switch between modal composition of the laser is especially important when the laser is used in Gaussian mode to focus on the smallest spot diameter and then is needed to switch to the ring mode when the laser can be aimed at a larger diameter focal spot (column 1, lines 20 – 27).

It would have been obvious at the time of the Applicant's invention to one of ordinary skill in the art to modify the apparatus of Smith with the control element of Borstel, et al. for the purpose of being able to easily and quickly switch between the Gaussian and ring modes depending on whether a small spot or larger spot diameter is being focused on by the laser beam as taught by Borstel, et al.

Claims 12 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mattes, et al. (U.S. 5,876,767) in view of Borstel, et al. (EP 00118825.9). Mattes, et al. teach a device for the layer-by-layer manufacture of a three-dimensional object by means of selective hardening at those sites of a layer of a building material that correspond to the cross-section of the object through the

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use of a laser (column 1, lines 58 – 60), the device comprising: a laser that provides radiation (item 5 – figure 1; column 2, lines 5 – 6); and a focusing unit that focuses the radiation to provide a focused beam (item 8 – figure 1; column 2, lines 7 – 8). However, Mattes, et al. do not teach that there is a beam expansion element or a switching element for changing the modal composition of the beam.

In a method to change the mode of a laser beam between Gaussian and ring modes, Borstel, et al. teach that there is a beam deflector and a control device (items 7 and 8 – figure 1a). There are adaptive mirrors and a simple control device that allow the selective generation of the Gaussian mode or ring mode in the laser resonator (items 23 and 24 – figure 2a). To switch between the two modes, the gas laser employs the use of adaptive beam deflectors and one adaptive retro-mirror (items 21 – 23 – figure 2a). This reads on the Applicant's claims that the laser device be further comprised of a switching element for changing the modal composition of the laser radiation, wherein the switching element comprises at least one mode aperture and wherein the laser device be further comprised of a beam expansion element. The ability to switch between modal composition of the laser is especially important when the laser is used in Gaussian mode to focus on the smallest spot diameter and then is needed to switch to the ring mode when the laser can be aimed at a larger diameter focal spot. Examiner is noting that Patent Application No. EP 00118825.9 is an equivalent of U.S. 6,512,781.

It would have been obvious at the time of the Applicant's invention to one of ordinary skill in the art to modify the apparatus of Mattes, et al. with the control

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element of Borstel, et al. for the purpose of being able to easily and quickly switch between the Gaussian and ring modes depending on whether a small spot or larger spot diameter is being focused on by the laser beam as taught by Borstel, et al.

Claims 12 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith (U.S. 6,391,245) in view of Borstel, et al. (EP 00118825.9). Smith teaches a device for the layer-by-layer manufacture of a three-dimensional object by means of selective hardening at those sites of a layer of a building material that correspond to the cross-section of the object through the use of a laser (column 5, lines 50 – 55), the device comprising: a laser that provides radiation (column 3, lines 60 – 65); and a focusing unit that focuses the radiation to provide a focused beam (column 4, lines 1 – 5; column 6, lines 34 – 35). However, Smith does not teach that there is a beam expansion element or a switching element for changing the modal composition of the beam.

In a method to change the mode of a laser beam between Gaussian and ring modes, Borstel, et al. teach that there is a beam deflector and a control device (items 7 and 8 – figure 1a). There are adaptive mirrors and a simple control device that allow the selective generation of the Gaussian mode or ring mode in the laser resonator (items 23 and 24 – figure 2a). To switch between the two modes, the gas laser employs the use of adaptive beam deflectors and one adaptive retro-mirror (items 21 – 23 – figure 2a). This reads on the Applicant's claims that the laser device be further comprised of a switching element for

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changing the modal composition of the laser radiation, wherein the switching element comprises at least one mode aperture and wherein the laser device be further comprised of a beam expansion element. The ability to switch between modal composition of the laser is especially important when the laser is used in Gaussian mode to focus on the smallest spot diameter and then is needed to switch to the ring mode when the laser can be aimed at a larger diameter focal spot. Examiner is noting that Patent Application No. EP 00118825.9 is an equivalent of U.S. 6,512,781.

It would have been obvious at the time of the Applicant's invention to one of ordinary skill in the art to modify the apparatus of Smith with the control element of Borstel, et al. for the purpose of being able to easily and quickly switch between the Gaussian and ring modes depending on whether a small spot or larger spot diameter is being focused on by the laser beam as taught by Borstel, et al.

Claims 12 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirano, et al. (EP 0406513 A1) in view of Borstel, et al. (EP 00118825.9). Hirano, et al. teach a device for the layer-by-layer manufacture of a three-dimensional object by means of selective hardening at those sites of a layer of a building material that correspond to the cross-section of the object through the use of a laser, the device comprising: a laser that provides radiation (column 3, lines 48 – 51); and a focusing unit that focuses the radiation to provide a focused beam (column 3, lines 45 – 55); however, Hirano, et al. do not teach the use of a

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switching element to change the modal composition of the laser. Hirano, et al., however, also teach that the optical system or laser is equipped, with two light emitting heads (items 33 and 33 – figure 8) – one light emitting head with a small diameter focusing on detailed parts of the surface portion of the object being cured and a second light emitting head with a large diameter focusing on the main part to schematically cure the main part (column 2, lines 45 – 55).

In a method to change the mode of a laser beam between Gaussian and ring modes, Borstel, et al. teach that there is a beam deflector and a control device (items 7 and 8 – figure 1a). There are adaptive mirrors and a simple control device that allow the selective generation of the Gaussian mode or ring mode in the laser resonator (items 23 and 24 – figure 2a). To switch between the two modes, the gas laser employs the use of adaptive beam deflectors and one adaptive retro-mirror (items 21 – 23 – figure 2a). This reads on the Applicant's claims that the laser device be further comprised of a switching element for changing the modal composition of the laser radiation, wherein the switching element comprises at least one mode aperture and wherein the laser device be further comprised of a beam expansion element. The ability to switch between modal composition of the laser is especially important when the laser is used in Gaussian mode to focus on the smallest spot diameter and then is needed to switch to the ring mode when the laser can be aimed at a larger diameter focal spot. Thus, Borstel, has solved the problem by which a gas laser has a relatively simple structure to enable switching between two different modes, whereby the laser can switch between a large and small diameter focal point (column 1, lines

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20 – 25, 42 – 45). Examiner is noting that Patent Application No. EP 00118825.9 is an equivalent of U.S. 6,512,781.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to modify the apparatus of Hirano, et al. with the control element of Borstel, et al. for the purpose of being able to easily and quickly switch between the Gaussian and ring modes depending on whether a small spot or larger spot diameter is being focused on by the laser beam as taught by Borstel, et al.

Response to Arguments

15. Applicant's arguments filed May 11, 2006 have been fully considered but they are not persuasive. Applicant argued that Borstel fails to teach using a laser with a switching element for the layer-by-layer manufacture of a three-dimensional object, thereby stating that the combination of Borstel with either Mattes or Smith lacks any suggestion to do so. Furthermore, in response to Applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, suggestion to combine either the primary reference of Smith or Mattes with

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Borstel is evident. Though Borstel may teach the use of a laser in the art of cutting thin sheet metal, Borstel, Mattes and Smith all use a laser and require a solution to the same problem – focusing on small diameter vs. large diameter spots, and thus, the combination of the references is valid. Furthermore, Examiner has also applied the reference of Hirano, et al. in view of Borstel to show further evidence as to the use of a laser in which a small diameter is used to focus on detail parts on the surface and a large diameter is used to focus on the main surface part. Thus, the apparatus of Hirano, et al. can be modified with the switching element of Borstel for the purpose of providing a laser with a relatively simple structure allowing switching between the different modes of operation of the laser, depending on whether the main surface part or detail part of the object is being cured.

Conclusion


16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Veronica D. Ewald whose telephone number is 571-272-8519. The examiner can normally be reached on M-F, 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MVE


JOSEPH S. DEL SOLE
PRIMARY EXAMINER
7/20/06